

UNPUBLISHED PRELIMINARY DATA

HAWAII INSTITUTE OF GEOPHYSICS
UNIVERSITY OF HAWAII
HONOLULU, HAWAII

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Attention: Code BG

Subject: Semiannual Status Report on NASA
Research Grant NsG-135-61

Gentlemen:

This letter constitutes the eighth semiannual status report of the airglow research under NASA Grant NsG-135-61. The report covers the period 1 October 1964 to 31 March 1965.

Observations:

The airglow observation program has continued during this period with a monochromatic scanning photometer at wavelengths 5577, 5893 and 6300A, and a digitized zenith photometer for absolute calibration. The broad-band photometer in the region of 8000A that has been operated cooperatively with Dr. F. E. Roach of the National Bureau of Standards has now been discontinued as over a year of data is on hand.

During this six-month period there were 102 scheduled observing nights on 51 of which observations were obtained for at least 2 hours and 40 of which observations were obtained for periods of 6 hours or more. A total of 386 hours of observations were obtained with the zenith photometer and 319 hours with the scanning photometer.

Instrumentation:

During this period the improved instrumentation for the scanning birefringent photometer discussed in the last report was put into operation. A considerable improvement is expected in the stability of the system and the consequent accuracy of the system calibration.

Airglow - Ionosphere Study Group:

During the month of March I brought here as consultants Dr. F. E. Roach of the National Bureau of Standards, Boulder, Colorado, and G.A.M. King of the Geophysical Observatory, Christchurch, New Zealand. Dr. Roach is, of course, one of the world's foremost airglow researchers, and G.A.M. King is an outstanding authority on the interpretation of the low-latitude ionosphere. He is the director of a number of ionospheric stations, including one on the island of Rarotonga in the South Pacific. This island has the unique feature of being very near to the exact magnetic conjugate point of our airglow station on Maui.

The purpose of the get-together was to make a concentrated study of the assembled data representing the Maui 6300A airglow, the Maui ionograms, and the Rarotonga ionograms. It has been well established by Barbier, Garman, and others, as well as ourselves, that the F-region ionosphere behavior is intimately associated with the behavior of the 6300A airglow. The reason for this relationship is fairly well understood in terms of photochemical processes and is the subject of a continuing study by V. Peterson and W. Steiger. But the reasons for the unusual behavior of both the airglow and ionosphere in the tropics is very poorly understood. The broad picture of this unusual behavior in the tropics is referred to as the "equatorial anomaly", but through the medium of the airglow observations we have been able to observe the detailed behavior in both time and space. With a more detailed knowledge of the nature of the equatorial phenomenon, we think we are somewhat closer to the elucidation of a mechanism to account for it.

Because of the great interest of this subject to other workers in the field, our group was joined for part or all of the 4-week period by Drs. Tom Van Zandt and Vern Peterson of the National Bureau of Standards and Dr. M. H. Rees of the University of Colorado.

Airglow - Ionosphere Study Group Staff:

There were a number of staff changes during this period. We were very sad to lose Dr. P. V. Kulkarni who decided to return to India to take up a position with Dr. Ramanathan at the Physical Research Laboratory in Ahmedabad. He will direct the airglow work at that institution. Observer Chester Dilley resigned effective 6 February 1965 and was replaced by Tomeo Kametani who began on 24 January 1965. Research assistant B. Cartmell resigned on 19 February 1965 to enter military service.

In addition to these persons already mentioned, the following persons have been involved in this program during part or all of this period:

National Aeronautics and Space Administration - 3

A. T. Kowalski, airglow station chief, Haleakala Observatory
D. McKnight, observer
R. Graham, observer and maintenance
W. Soong, junior physicist
J. Larson, research assistant
L. Ogura, research assistant
J. Heu, student assistant
G. Young, student assistant
W. Brown, graduate student
W. Steiger, principal investigator

Visitors:

In addition to those who participated in the airglow-ionosphere study session mentioned earlier, the following honored us with brief visits:

Dr. E. H. Carman of the University of Townsville, Townsville, Australia, who was on his way to a new post in Basutoland, Africa. The airglow station he established in Townsville is conjugate to Hawaii's, being at approximately the same geomagnetic latitude in the southern hemisphere. His observer, Leon Offenhauser, was one of our former observers.

Dr. S.-I. Akasofu of the Geophysical Institute, University of Alaska, College, Alaska.

Dr. K. Davies of the National Bureau of Standards, Boulder, Colorado.

Publications:

1. P. V. Kulkarni, "On the height of the 5577A [OI] airglow layer in Hawaii" *Annales de Geophysique*, No. 1, 1965 (Reprints will be sent as soon as they become available)
2. V. Peterson and W. Steiger, "46300 [OI] nightglow emission. Part II. Application of theory" in preparation.
3. P. V. Kulkarni and W. Steiger, "Correlation study of airglow emissions" in preparation.
4. W. Steiger, F. E. Roach, and W. Brown, "The alignment of 6300A airglow isophotes" in preparation.

National Aeronautics and Space Administration - 4

Please do not hesitate to call on us if further information should be needed concerning activities under this grant.

Respectfully submitted,

Walter R. Steiger
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Hawaii Institute of Geophysics